

PSD Modeling Workgroup

EPA/State/Local Workshop

New Orleans

May 17, 2005

Members:

Annamaria Coulter	EPA Region 2
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Denny Lohman	EPA Region 3
Erik Snyder	EPA Region 6
Herman Wong	EPA Region 10
John Notar	National Park Service
Kevin Golden	EPA Region 8
Leon Sedefian	New York State
Mary Peyton Wall	South Carolina State
Philip Allen	Oregon State
Stanley Krivo	EPA Region 4
Tom Rogers	Florida State

Issues Received by the Workgroup:

1. Reconcile the difference between the form of the PM10 and PM2.5 NAAQS so that ISC and AERMOD can calculate this new form. (i.e., 99th percentile vs 98th percentile, and annual average vs 3 year average.) Need a memo similar to the March 17, 1998 Bill Hunt memo.
2. Preconstruction Monitoring de minimis levels for PM2.5
3. Significant Impact Levels for PM2.5 (used for cumulative source requirements, and cause/contribute test)
4. Endangered Species - how to handle in NSR
5. Ambient Air (including leased property issue, exclusion zones for offshore sources)
6. NO2 modeling, (all GAQM tiers are "screening", therefore cannot take credit). How can this be handled?
7. Significant Concentration Gradients (see related #24 and #26)
8. Preconstruction Monitoring guidance
9. Short term vs annual emission for short term increments
10. How is increment modeled?
 - option 1. Use allowable emissions as a first screen (assumes no change in baseline, or emission decreases)
 - option 2. If there are change in baseline which the modeler wants to take credit for, then all baseline emissions increase are modeled as actual +, and all baseline emissions decreases are modeled as actual -.
 - option 3. Calculate the delta between the emission and model that emission rate.
11. Paired in time and space?
12. Include mobile, area or fugitive emissions in the increment?
13. Class I emission inventory centered around proposed source or Class I area?
14. Use of ISC-PRIME after AERMOD promulgation
15. Recent actual emissions for assessment of PSD increment (e.g., within last 3 years)
16. Default background concentrations should be based on recent monitoring values (e.g., within

last 5-8 years), (see issue#8)

17. Minor source baseline date (MinSBD). Associated with the receptor location not project location.

For large SIA, use the earliest MinSBD of any county (PSD area) within the SIA to select inventory PSD sources

More refined modeling, use the various MinSBD for each county (PSD area)

18. Additional visibility analysis, Visibility in Class II area

19. VOC/Ozone assessments (in NSR?)

20. Modeling of toxics under NSR

21. PSD Class I SIL values (FLM, proposed EPS, 1 ug/m³ annual impact)

22. Modeled emission rates depend on

Project vs other emission sources

NAAQS vs PSD increment assessments

Short-vs long-term impacts

23. Hierarchy of emission rates for modeling

Acknowledgment of difficulty in following guidance give the available emission information. Establish hierarchy of possible emission estimates from conservative to more realistic (e.g., allowable, % of allowable, recent actual, etc.)

24. Application of 20D procedure (Annual vs short-term; grouped sources; total for facility)

26. Identify sources eliminated from modeling with reason .

27. Refined 100-m resolution modeling;
maximum and challenging concentrations

28. Most recent 5-year meteorological period (When are data too old?)

29. Use of ASOS meteorological data

30. Representative tests for meteorological data with AERMOD

31. Use of Model vs Monitored data

32. Calibration of Models

Priority:

High: Need is imminent and crucial to the implementation of the NSR program

Medium: Need is crucial

Low: Need but not imminent, probably just needs clarification

Guidance:

Exists (needs to be resurfaced)

Exists but unclear

Missing

<u>Issue:</u>	<u>Lead</u>	<u>Priority</u>	<u>Guidance</u>
1.	AC & Denny	High	Missing
2.	Herman	Medium	Missing
3.	Stan	High	Missing
4.	JohnN	Medium	Ex/Unclear
5.	Dan	Medium	Ex/Unclear
6.	Herman	High	Missing
7.	Leon, Mary	Low	Exists
8.	Herman	Low	Exists
9.	Kevin	High	Ex/Unclear
10.	Kevin	High	Ex/Unclear
11.	Tom	Medium	Exists
12.	Mary	Low	Exists
13.	JohnN.	High	Exists
14.	Aermod wg*	Medium	Missing
15.	Kevin	High	Exists
16.	Herman	Low	Exists
17.	Stan	Medium	Exists
18.	Phil	High	Exists
19.	Erik	High	Missing
20.	Denny	Low	Ex/Unclear
21.	JohnN	High	Missing
22.	Phil	High	Exists
23.	Kevin	High	Exists
24.	Leon, Mary	Low	Exists
25.	Leon, Mary	Low	Exists
26.	Stan	Medium	Exists
27.	Tom	High	Ex/Unclear
28.	Stan	Medium	Exist
29.	Tom	High	Ex/Unclear
30.	Aermod wg*	High	Missing
31.	Annamaria	Medium	Exists
31.	Annamaria	Medium	Exists

References and Documentation (draft - work in progress)

1. Reconcile the difference between the form of the PM10 and PM2.5 NAAQS so that ISC and AERMOD can calculate this new form. (i.e., 99th percentile vs 98th percentile, and annual average vs 3 year average.) Need a memo similar to the March 17, 1998 Bill Hunt memo.

**** Missing: Issue presented to the Model Clearinghouse and post processor under development.**

References:

PM10

Modeling for Revised PM10 Standards, William Hunt, Jr., March 17, 1998

SCRAM: ISC Users Guide 9/1995
Generation of High-Sixth-High for 24-hour NAAQS

SCRAM: Model Change Bulletin MCB#4 11/02/1998
Modification of ISC3 to calculate H-4-H (99th percentile) over multiple years.

SCRAM: Model Change Bulletin MCB#6 12/22/1998
Correct error in ISC to calculate annual mean.

SCRAM: Revised AERMOD Users Guide 8/2002
Generation of High-Sixth-High for 24-hour NAAQS

EPA-450/R-99-008 Guideline On Data Handling Conventions For The PM NAAQS April 1999

40 CFR Part50 Appendix K Interpretation of the national ambient air quality standards for particulate matter

PM_{2.5}

40 CFR Part50 Appendix N Interpretation of the national ambient air quality standards for particulate matter (Note: References to PM-10 vacated by May 14, 1999 decision in American Trucking Association v. EPA)

To: Annamaria Coulter/R2/USEPA/US@EPA

From: Denny Lohman/R3/USEPA/US

Date: 04/20/2005 06:48AM

cc: Warren Peters/RTP/USEPA/US@EPA, Wilkie.Walter@epa.gov

Subject: Re: PM2.5 modeling

(Email from Denny Lohman EPA Region 3 to Annamaria Coulter EPA Region 2, copy to Warren Peters OAQPS, et al)

Annamaria,

Two percent (2%) of 365 is 7.3. Therefore all but 7.3 of the 365 possible daily values must, on average, be below 150 $\mu\text{g}/\text{m}^3$. Since we don't consider partial days the cutoff is more than 7, i.e., 8. If at the highest concentration site the eighth-highest value is greater than 150 the site violates the NAAQS.

The annual standard metric is the average of annual averages. For area compliance determinations from monitoring Appendix K specifies the average of three years. The difference between monitored attainment and modeled attainment is that monitoring must always be retrospective. With modeling we project into the future, assuming that our meteorological data is temporally representative of, as I like to characterize, the remaining lifetime of the universe.

2. Preconstruction Monitoring de minimis levels for PM2.5

Missing: Past monitoring de minimis levels based on monitor minimum detection levels. 3 micrograms per cubic meter for a 24-hour average is the minimum detection level. This number is from QA people at OAQPS via Region 10 monitoring staff.

3. Significant Impact Levels for PM2.5 (used for cumulative source requirements, and cause/contribute test).

05/05/05

2005 Modelers Workshop - PSD Workgroup

Issue # 3 - PM2.5 Significant Impact Levels (SIL)

General - The PSD SIL are used to:

- Determine if a project will cause a significant impact. Maximum concentrations less than or equal to the SIL do not require refined cumulative NAAQS and PSD increment impact assessments.
- Define the significant impact area (SIA); the area requiring the refined cumulative impact assessment.
- Evaluate modeled NAAQS and/or PSD increment violations; emissions with concentrations less than or equal to SIL can not significantly contribute to the violation so the proposed project can be permitted.

Note that SIL are provided for each combination of criteria pollutant and averaging period. Currently there are no defined PM2.5 SIL nor PSD increments.

Current Status PM2.5 SIL - Specific SIL for PM2.5 emissions have not been provided. Establishing SIL must consider both direct as well as condensable components. The current policy for PM2.5 address only direct emissions. This should also be applicable to any defined PM2.5 SIL.

Current PM2.5 Nonattainment and PSD Implementation Policy - The current PM2.5 implementation policy is to use PM10 as the surrogate, for both for both nonattainment NSR and attainment PSD

References

- John S. Seitz Memorandum (10/23/97); Interim Implementation of New Source Review Requirements for PM2.5

4. Endangered Species - how to handle in NSR

See NPS ppt presentation :

Memo: Request for Clarification of Prevention of Significant Deterioration Baseline Area and Corresponding Baseline Date for Breton National Wildlife Refuge, Bill Harnett, April 5, 1999

5. Ambient Air (including leased property issue, exclusion zones for offshore sources)

Currently in progress

6. NO₂ modeling, (all GAQM tiers are "screening", therefore cannot take credit). How can this be handled?

Appendix W, Section 6.2.4

PVMMR - underdevelopment

If ARM is 0.75, then can 25 percent credit be given?

7, 24 and 26: . Significant Concentration Gradients: Determination of Inventory of Nearby Sources

(**Note:** this issue is more generic than just PSD affected since most PSD increment analysis incorporate all nearby PSD consuming sources)

To determine the cumulative impacts from the proposed source in combination with a set of nearby sources, EPA's *Guideline on Air Quality Models* (at Section 9.2.3.b) recommends that all sources expected to cause "a significant concentration gradient in the vicinity" of the proposed source should be explicitly modeled. However, owing to the uniqueness of each situation and the numerous variables involved in defining this set of sources, the *Guideline* does not provide a comprehensive definition. Rather, the *Guideline* recommends the use of professional judgment in these case by case determinations.

Section IV.C.1 of EPA's *New Source Review Workshop Manual* provides an upper bound on the determination of where such nearby sources can be located by confining that area to an annular area defined as the circular significance impact area (SIA, also defined as "vicinity") of the proposed source, plus 50km. Although the formulation of the inventory of the nearby sources is the applicant's responsibility, the reviewing authority has to review and concur with the list of sources to be explicitly modeled. For practical reasons, it has also been recognized that the starting point of developing such a list nearby source list can contain a certain emission rate threshold.

The concept of "significant concentration gradient" is used to catch all instances not represented by "regional" monitored concentrations, added to the combined sources' impacts to determine total impacts, which could interact with the proposed source's impacts. However, without some practical limitations, such gradients can occur anywhere in the "vicinity" of the sources defined by the SIA and could lead to a large and, at times, unnecessary resource expenditures. Thus, in order to balance the need for identifying all sources which meet the criteria in the *Guideline* and also to achieve a workable inventory of sources, various permitting agencies have developed and used objective tools to assist in the determination of an emission inventory. A 1992 EPA/States modelers workgroup considered some of these approaches and concluded that all such tools should be used by the reviewing authority on a case by case basis to compliment their professional judgment in developing an inventory of nearby sources. This recommendation affirmed a previous Clearinghouse determination not to limit the flexibility provided by the *Guidelines* for a case by case professional judgment (see: <http://www.epa.gov/scram001/guidance/mch/mbg3.txt>)

A few of the methods developed by states are briefly describes below:

1) **The 20D Method.** One of the earliest methods, developed by North Carolina, was a simple test of identifying the nearby sources' emissions through the formula derived as 20 times the distance to the source. The method was detailed in a July 22, 1985 letter to EPA and accepted by Region IV in September 1985. The method was designed to eliminate sources beyond the SIA but within the plus 50 km screening area. The method suggests to include those sources within the screening area when $Q \geq 20D$, where Q is the maximum emission rate

(tons/yr) of the source and D is the distance (km) from either: 1) the source in the screening area to the nearest edge of the impact area (long-term analyses) or 2) the source in the screening area to the PSD source defining the impact area (short-term analyses). It should be noted that the source is defined as the facility or complex, not an individual stack or other emission point; therefore, cumulative emissions of each pertinent pollutant go through the screening process. Other states have either adopted this approach or some form of it. For example, South Carolina has adopted additional practices while using this method. That is, no sources that have undergone a PSD review for increment expansion or consumption may be eliminated by the screening process; and, the approach must be consistent among sources, meaning if increment consuming sources are included, then increment expanding sources must also be included in the screening.

2) **GRAD/D² Method.** This method was developed by NYSDEC in 1992 after EPA determined that certain methods proposed for use did not satisfy the “significant concentration gradient in the vicinity” concept. Six approaches were developed and tested on three project which had been previously modeled with all nearby major sources determine to be within the SIA. It was found that the method using a certain concentration gradient (GRAD) divided by distance (D) squared best matched the ranking of the nearby sources which had been previously selected and modeled for the three projects. The proposed method was approved in a Clearinghouse determination for a resource recovery project in 1994, with the caveat that this tool be used to complement professional judgement on a case by case determinations. A brief description of the method is available at: <http://www.epa.gov/scram001/guidance/mch/cfym98.txt> while the background document can be supplied by NYSDEC.

3) **Range of Influence (ROI) method.** Developed and used by the state of Oregon, the ROI screening test is used to flag sources that potentially would not be included in a competing source analysis. If a "nearby" source, at its emission rate, is located at distance greater than the ROI, then it would be considered potentially not significant. The actual determination to exclude it from a competing source inventory would also include other factors, including size, distance, topography, and meteorology. The procedure is as follows:

$$ROI = Q / K$$

where,

ROI = distance from a potential competing source to the Significant Impact Area (SIA) of the proposed source. Maximum ROI is 50 km; however the Department may request that sources at a distance greater than 50 km be included in the analysis.

Q = emissions of potential competing source in tons per year.

K = pollutant specific factor, as follows.

PM10 = 5

SO₂ = 5

NO_x = 10

CO = 40

Pb = 0.15

8. Preconstruction Monitoring guidance:

40CFR 52.21(m)(1)(iii) and (iv),

Ambient Monitoring Guidelines for Prevention of Significant Deterioration, Section 2 and technical judgement
Appendix W, Section 9.2

EPA's Draft New Source Review Manual, Part I, Chapter C, Section III.A,
Ambient Monitoring Guidelines for Prevention of Significant

9. Short term vs annual emission for short term increments

Letter from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Jeff Burgess, Director, Division of Environmental Engineering, State of North Dakota Department of Health (February 1, 2000) (on file at EPA Region VIII, Denver, Colorado).

40 C.F.R. pt. 51 Appendix W § 11.2.3.3 (b)(emphasis added). *See also*, 40 C.F.R. pt. 51 Appendix W § 11.2.3.3

See United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Draft New Source Review Workshop Manual, at C.69 - C.70 (October, 1990) (*available at* <http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/1990wman.pdf>) [hereinafter Workshop Manual].

See e.g., Memorandum from John S. Seitz, Director, Stationary Source Compliance Division, Office of Air Quality Planning and Standards, to Air Management Division Directors, EPA Regional Offices, "Clarification of New Source Review Policy on Averaging Times for Production Limitations," (April 8, 1987) (*available at* <http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/avetimes.pdf>);

Memorandum from Thomas W. Devine, Director, Air and Hazardous Materials Division, Environmental Protection Agency Region IV, to State and Local Air Directors, "Policy Determinations Regarding PSD Questions" (July 31, 1981) (*available at* <http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/r4sum.pdf>);

United States Environmental Protection Agency SO₂ Guideline Document - Appendices, Office of Air Quality Planning and Standards, EPA-452/R-94-008, at 6-14 (February 1994);
Memorandum from Gerald A. Emison, Director, Office of Air Quality Planning and Standards, to David Kee, Director, Air Management Division, Region V (November 24, 1986) (*available at* <http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/shrtterm.pdf>).

10. How is increment modeled?

option 1. Use allowable emissions as a first screen (assumes no change in baseline, or emission decreases)

option 2. If there are change in baseline which the modeler wants to take credit for, then all baseline emissions increase are modeled as actual +, and all baseline emissions decreases are modeled as actual -.

option 3. Calculate the delta between the emission and model that emission rate.

United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Draft New Source Review Workshop Manual, at pg C 44-C50. (October, 1990)

US EPA Model Clearinghouse MCHISRS system, Record Number 92-IV-06

11. Paired in time and space?

Regulatory:

CAA – Does not specify

Regulations – Part 51, Appendix W Section 11.2.3.3 b.

b. Screening techniques defined in subsection 4.1 can sometimes be used to estimate short term incremental concentrations for the first new source that triggers the baseline in a given area. However, when multiple increment-consuming sources are involved in the calculation, the use of a refined model with at least 1 year of site specific or 5 years of (off-site) NWS data is normally required (subsection 9.3.1.2). **In such cases, sequential modeling must demonstrate that the allowable increments are not exceeded temporally and spatially, i.e., for all receptors for each time period throughout the year(s) (time period means the appropriate PSD averaging time, e.g., 3-hour, 24-hour, etc.).**

Guidance/Memos – New Source Review Workshop Manual (puzzle book) does not state explicitly, but implies a time and space calculation. A number of EPA memos and other correspondence have consistently upheld the position of a time and space calculation.

Memo from Sheldon Myers to Regions Feb. 17, 1983 (on NSR site)

Memo from A. Smith to S. Myers, May 3, 1983 (on NSR site)

Memo from John R. O’Conner to Thomas Devine Jan 20, 1984 (on SCRAM and NSR)

Brief Background:

The origin of this policy (later turned in to regulation) appears to not be a conscious decision but rather a consequence of simplifying the PSD modeling and increment inventory requirements. That is, modeling only the increment affecting sources as positive and negative emissions in a Gaussian plume model implicitly makes a time and space calculation.

Nevertheless, a reading of the CAA language related to baseline concentration and considering Congressional intent, the PSD calculation could arguably be interpreted as intended to be spatial only (a difference of maximums). The resolution of this interpretation is a policy issue that may, in fact, be largely settled just by virtue of the current policy’s long standing.

Recommendation:

Request that the EPA policy group reevaluate the consistency of the current policy with the CAA and Congressional intent and provide an analysis report making a final determination in writing.

12. Include mobile, area or fugitive emissions in the increment?

<http://www.epa.gov/Region7/programs/artd/air/nsr/nsrmemos/incana.pdf>

New Source Review Workshop Manual, Part I, Chapter C, Section IV.C.2, p. C36, Draft October 1990, EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

If, in the impact area or surrounding screening area, area or mobile source emissions will affect increment consumption, then emissions input data for such minor sources are also included in the increment inventory. The change in such emissions since the minor source baseline date (rather than the absolute magnitude of these emissions) is of concern since this change is what may affect a PSD increment. Specifically, the rate of growth and the amount of elapsed time since the minor source baseline date was established determine the extent of the increase in area and mobile source emissions. For example, in an area where the minor source baseline date was recently established (e.g., within the past year or so of the proposed PSD project), very little area and mobile source emissions growth may have occurred. Also, sufficient data (particularly mobile source data) may not yet be available to reflect the amount of growth that has taken place. As with the NAAQS analysis, applicants are not required to estimate future mobile source emissions growth that could result from the proposed project because they are excluded from the definition of "secondary emissions."

The applicant should initially consult with the permitting agency to determine the availability of data for assessing area and mobile source growth since the minor source baseline date. This information, or the fact that such data is not available, should be thoroughly documented in the application. The permitting agency should verify and approve the basis for actual area source emissions estimates and, especially if these estimates are considered by the applicant to have an insignificant impact, whether it agrees with the applicant's assessment.

When area and mobile sources are determined to affect any PSD increment, their emissions must be reported on a gridded basis. The grid should cover the entire impact area and any areas outside the impact area where area and mobile source emissions are included in the analysis. The exact sizing of an emissions inventory grid cell generally should be based on the emissions density in the area and any computer constraints that may exist. Techniques for assigning area source emissions to grid cells are provided in Reference 11. The grid layout should always be discussed with, and approved by, the permitting agency in advance of its use.

13. Class I emission inventory centered around proposed source or Class I area?

See FLM recommendation which says to center emission inventory around Class I area

14. Use of ISC-PRIME after AERMOD promulgation : forward to Aermod Implementation workgroup.

15. Recent actual emissions for assessment of PSD increment (e.g., within last 3 years)

45 Fed. Reg. 52676, 52718 (Aug. 7, 1980).

See United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Draft New Source Review Workshop Manual, at C.11 (October, 1990) (*available at* <http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/1990wman.pdf>)

40 C.F.R. § 51.166(b)(21)(ii)

16. Default background concentrations should be based on recent monitoring values (e.g., within last 5-8 years), (see issue#8)

EPA does not have default background concentrations.

Default background concentrations should be based on recent monitoring values (e.g., within last 3 years as this the definition in Ambient Monitoring Guideline), (see issue#8)

17. Minor source baseline date (MinSBD). Associated with the receptor location not project location.

For large SIA, use the earliest MinSBD of any county (PSD area) within the SIA to select inventory PSD sources

More refined modeling, use the various MinSBD for each county (PSD area)

Issue # 17 - Minor Source Baseline Date (MSBD)

General - The minor source baseline date is defined as the earliest date, after the defined trigger date, on which a complete PSD application is received by the permitting agency. This MSBD is established for the baseline area associated with the location of the application. Baseline areas are defined by the states. Baseline areas ranges in size from whole state, to individual counties, to sub-county areas.

Prior General Practice - Prior to the Harnett memorandum of 04/05/99 one MSBD was used to determine PSD affecting emission sources for a project's PSD increment assessment - the MSBD assigned to the baseline area where the proposed project is located. When considering projects with large impact areas encompassing a number of baseline areas or emission sources that have significant impacts in baseline areas other than the one in which they are located, defining the appropriate MSBD becomes complicated. That is, the proposed project will have one MSBD while existing impacting sources in other baseline areas may have different MSBD. Question - Which MSBD is used to identify the PSD emission sources to be used in the increment modeling?

Current Guidance - Once a MSBD is established in a baseline area, EPA believes any changes in air quality in the area affects the PSD increment in the area. The source of the emissions affecting the air quality is not of concern. Therefore, emission sources located in other baseline areas with different MSBD will affect the PSD increment in the baseline area of concern based only on the MSBD of the location being modeled. Therefore, the MSBD to be used to identify PSD emission sources for increment modeling is the MSBD of the location of the receptor being modeled.

References

- Bill Harnett Memorandum (04/05/99); Request to Clarify Prevention of Significant Deterioration (PSD) Baseline Area and Corresponding Baseline Date for Breton National Wildlife Refuge and Wilderness Area

- New Source Review Workshop Manual (Draft; October 1990); Pages C.6 through C.9

18. Additional visibility analysis, Visibility in Class II area

available on SCRAM:

IWAQM

PLUVUE

VISCREEN

FLAG

NSR Workshop Manual

CAA

19. VOC/Ozone assessments (in NSR?)

No meaningful guidance exists on this. At most there are the Scheffe table with very limited use.

Recommendation: Need Model Clearinghouse support.

20. Modeling of toxics under NSR

The modeling of Air Toxics impacts not a requirement under PSD. There are no air quality standards. Toxics indirectly controlled via emission limits of VOCs. However, air toxics is a frequent question asked by public under the Environmental Justice programs. In this case, the best estimate may be made by quantifying emission loads and compare to reference group (see AES-PR, 1998)

Models available on SCRAM include TSCREEN and maybe ASPEN (?)

21. PSD Class I SIL values (FLM, proposed EPS, 1 ug/m³ annual impact)

see FLM recommendations.

22. Modeled emission rates depend on:

Project vs other emission sources

NAAQS vs PSD increment assessments

Short-vs long-term impacts

See 40CFR Part 51 Appendix W for NAAQS and significant impact levels.

23. Hierarchy of emission rates for modeling

Acknowledgment of difficulty in following guidance give the available emission information. Establish hierarchy of possible emission estimates from conservative to more realistic (e.g., allowable, % of allowable, recent actual, etc.)

See USEPA Memorandum from Eric Noble on February 22, 1992 regarding “Distribution of Report on Procedures to Estimate Nitrogen Oxides (NOX) Emission Increases from Mobile and Area Sources for Prevention of Significant Deterioration (PSD) Increment Analyses”.

1980 PSD preamble {45FR at 52718, col. 3}

Westar PSD Reform Recommendations, Issue 4- Emissions Characterization, April 2005

Acknowledgment of difficulty in following guidance give the available emission information. Establish hierarchy of possible emission estimates from conservative to more realistic (e.g., allowable, % of allowable, recent actual, etc.)

27. Refined 100-m resolution modeling; maximum and challenging concentrations
(?)

28. Most recent 5-year meteorological period (When are data too old?)

Issue has been visited at various times including past EPA/State/Local Modelers workshop. See presentation by Jim Yarsborough (Region 6) and MCHIRS. Should we re-open for new discussion?

29. Use of ASOS meteorological data

Issue: Use of ASOS Data

Regulatory:

CAA: Does not address this issue.

Regulations: Part 51 Appendix W Section 9.3.1.2 a.

“... Where professional judgment indicates NWS-collected ASOS (automated surface observing stations) data are inadequate (for cloud cover observations), the most recent 5 years of NWS data that are observer-based may be considered for use.”

Guidance/Memos:

“Analysis of the Affect of ASOS-Derived Meteorological Data on Refined Modeling” EPA-454/R-97-014, Nov. 1997

Meteorological processors (PCRAMMET, AERMET) provide mechanisms to use ASOS data

Brief Background:

The implementation of ASOS ended the historic observer-based system of meteorological observations. The data collection techniques of ASOS differ from the previous system leading to differences in air quality modeling results. These differences are associated with cloud cover and ceiling height, wind data, and temperature. Methodology has been developed to convert the ASOS cloud data to equivalent (or as equivalent as can be done) observer-based data, but questions remain on the impacts to performance in the models. Currently, “professional judgment” is used to determine whether the use of ASOS is appropriate.

Recommendation:?

See also, email between Tom Rogers, Florida and Dennis Atkinson, OAQPS

All,

I heard back from Dennis Atkinson regarding ASOS guidance. He did not have any additional information (e.g., guidance memos) beyond what I specified. He does state that the 1997 ASOS report does indicate no bias between ASOS and observer-based data. This is what Annamaria and others on the call correctly recalled. He also states that ASOS is now the official meteorological record, so if we want to use more recent data, this is it. His e-mail follows:

Hi Tom,

My apologies for not getting to respond sooner. If anyone complains about your late response, you can blame me!

The official guidance on the use of ASOS is basically what you described. Appendix W does not formally address the particular

(ASOS) issue. It does say that the latest 5 years of met. data should be used. Of course, ASOS is a primary source of the data during this latest period.

The document that you referenced was generated through a contract study that I oversaw. It basically concluded that ASOS was not biased in any particular way, comparing an observed site vs. a co-located ASOS site. The scatter of 1:1 was approximately evenly distributed.

When ASOS first existed, there was the issue about ceiling heights only being measured to 12,000 ft. Also, cloud coverage is reported as CLR, SCT, BKN, OVC. These were converted into the following tenths: 0, 3, 7, 10, respectively. Another point is that ASOS is now the record of choice by NWS, thereby requiring users to accept the changes, etc.

I hope this helps a little. Not sure if I added any information outside of what you already knew.

If you have any questions, just let me know.
Dennis

Dennis Atkinson
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Please note: Florida has a very broad public records law. Most written communications to or from state officials regarding state business are public records available to the public and media upon request. Your e-mail communication may therefore be subject to public disclosure

30. Representative tests for meteorological data with AERMOD:

Forward to AERMOD Implementation workgroup

31. Use of Model vs Monitored data:

Excerpts from CAA and Regulations on Modeling vs Monitoring.

Clean Air Act

Sec. 110 (a) (1) Each State shall, (D) contain adequate provisions-(i) prohibiting..any source..within the State from emitting any air pollution in amounts which will-(I) contribute significantly to nonattainment, or maintenance plans.

(K) provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard and (ii) the submission, upon request of the data related to such air quality modeling to the Administrator.

165 (e) (3) The Administrator shall..promulgate regulation which..(D) shall with reasonable particularity each air quality model or models to be used..Any model or models..may be adjusted upon a determination, after notice and opportunity for public hearing,..that such adjustment is necessary to take into account unique terrain or meteorological characteristics of an area potentially affected by emissions from a source applying for a permit..

40 CFR 52.21 (l)(1) *Air Quality Models*. (1) All estimates of ambient concentrations required under this paragraph shall be based on applicable air quality models, data bases, and other requirements specified in appendix W of part 51 of this chapter (Guideline on Air Quality Models).

40 CFR Part 51 Appendix S: *Review of specified sources for air quality impact*. For stable air pollutants the determination of whether a source will cause or contribute to a violation of an NAAQS generally should be made..using an atmospheric simulation model...

40 CFR Part 51 Appendix W: The Guideline on Air Quality Models.

Preamble: The Guideline is used by EPA, States, and industry to prepare and review new source permits and State Implementation Plan revisions. The Guideline is intended to ensure consistent air quality analyses for activities regulated at 40 CFR 51.112, 51.117, 51.150, 51.160, 51.166, and 52.21.

Appendix W: 1.0 INTRODUCTION b. Due to limitations in the spatial and temporal coverage of air quality measurements, monitoring data normally are not sufficient as the sole basis for demonstrating the adequacy of emission limits for existing sources. Also, the impacts of new sources that do not yet exist can only be determined through modeling. Thus, models, while uniquely filling one program need, have become a primary analytical tool in most air quality assessments. Air quality measurements can be used in a complementary manner to dispersion

models, with due regard for the strengths and weaknesses of both analysis techniques. Measurements are particularly useful in assessing the accuracy of model estimates. The use of air quality measurements alone however could be preferable, as detailed in a later section of this document, when models are found to be unacceptable and monitoring data with sufficient spatial and temporal coverage are available.

8.2 Background Concentrations

8.2.1 Discussion

c. If the source is not isolated, it may be necessary to use a multi-source model to establish the impact of nearby sources. Since sources don't typically operate at their maximum allowable capacity (which may include the use of "dirtier" fuels), modeling is necessary to express the potential contribution of background sources, and this impact would not be captured via monitoring. Background concentrations should be determined for each critical (concentration) averaging time.

10.2.2 Use of Measured Data in Lieu of Model Estimates

a. Modeling is the preferred method for determining emission limitations for both new and existing sources. When a preferred model is available, model results alone (including background) are sufficient. Monitoring will normally not be accepted as the sole basis for emission limitation. In some instances when the modeling technique available is only a screening technique, the addition of air quality data to the analysis may lend credence to model results.

b. There are circumstances where there is no applicable model, and measured data may need to be used. However, only in the case of an existing source should monitoring data alone be a basis for emission limits. In addition, the following items (i - vi) should be considered prior to the acceptance of the measured data:

- i. Does a monitoring network exist for the pollutants and averaging times of concern?
- ii. Has the monitoring network been designed to locate points of maximum concentration?
- iii. Do the monitoring network and the data reduction and storage procedures meet EPA monitoring and quality assurance requirements?
- iv. Do the data set and the analysis allow impact of the most important individual sources to be identified if more than one source or emission point is involved?
- v. Is at least one full year of valid ambient data available?
- vi. Can it be demonstrated through the comparison of monitored data with model results that available models are not applicable?

c. The number of monitors required is a function of the problem being considered. The source configuration, terrain configuration, and meteorological variations all have an impact on number and placement of monitors. Decisions can only be made on a case-by-case basis. Guidance is available for establishing criteria for demonstrating that a model is not applicable.⁷

d. Sources should obtain approval from the appropriate reviewing authority (paragraph 3.0(b)) for the monitoring network prior to the start of monitoring. A monitoring protocol agreed to by all concerned parties is highly desirable. The design of the network, the number, type and location of the monitors, the sampling period, averaging time as well as the need for

meteorological monitoring or the use of mobile sampling or plume tracking techniques, should all be specified in the protocol and agreed upon prior to start-up of the network.

10.2.3.3 PSD Air Quality Increments and Impacts

a. The allowable PSD increments for criteria pollutants are established by regulation and cited in 40 CFR 51.166. These maximum allowable increases in pollutant concentrations may be exceeded once per year at each site, except for the annual increment that may not be exceeded. The highest, second-highest increase in estimated concentrations for the short term averages as determined by a model should be less than or equal to the permitted increment. The modeled annual averages should not exceed the increment

(Regarding the space and time issue)

b. Screening techniques defined in subsection 4.2.1 can sometimes be used to estimate short term incremental concentrations for the first new source that triggers the baseline in a given area. However, when multiple increment-consuming sources are involved in the calculation, the use of a refined model with at least 1 year of site specific or 5 years of (off-site) NWS data is normally required (subsection 8.3.1.2). In such cases, sequential modeling must demonstrate that the allowable increments are not exceeded temporally and spatially, i.e., for all receptors for each time period throughout the year(s) (time period means the appropriate PSD averaging time, e.g., 3-hour, 24-hour, etc.).

32. Calibration of Models:

40 CFR Part 51 Appendix W section 7.2.9 Calibration of Models

a. Calibration of models is not common practice and is subject to much error and misunderstanding. There have been attempts by some to compare model estimates and measurements on an event-by-event basis and then to calibrate a model with results of that comparison. This approach is severely limited by uncertainties in both source and meteorological data and therefore it is difficult to precisely estimate the concentration at an exact location for a specific increment of time. Such uncertainties make calibration of models of questionable benefit. Therefore, model calibration is unacceptable.